



# **Pipeliners Biodiesel Steering Committee: Technical Needs for Biodiesel Blends in US Pipelines**

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DOT/PHMSA Road Mapping Meeting

- Pipeliner Biodiesel Steering Committee (PBSC)
- 5 Major Pipeline Companies:
  - Buckeye, Colonial, Explorer, Magellan, Teppco
- National Biodiesel Board & two biodiesel producers
- Identify technical and regulatory issues and questions regarding transport of biodiesel blends on US pipelines
- Work with others to secure data, approvals and ensure all issues are addressed
- Not involved with economics or policy issues

- Dec 2007 ASTM meeting; pipeline discussions
- In 2007 the inclusion of biodiesel in the diesel specs became apparent
- RFS will result in pipeline stakeholders (i.e. refiners) wanting to utilize pipelines for transporting biodiesel blends
- Concept to form a Pipeliner group was initiated
- January 2008 first official face to face meeting
- Six face to face meetings, several conference calls

- Biodiesel is made by reacting vegetable oils, animal fats, or used cooking oils (100 lbs) with methanol (10 lbs) to produce Biodiesel (100 lbs) and glycerine (10 lbs)
- Vegetable oils and animal fats are a by-product of growing food:
  - No one is growing soybeans or raising livestock to get oil for biodiesel
  - Soybeans are 80% high protein meal, 20% soybean oil
  - Cattle/hogs/chicken are ~ 90% edible meat at 10% oil
- Oils and fats are naturally high in energy content vs other biomass
  - Mother nature's preferred way to store energy
- 80-90% of the energy to grow oils and fats are associated with growing the food, not oil for biodiesel
- US DOE life cycle Energy Balance: Over 3.2 to 1
- US EPA life cycle GHG vs. petrodiesel: ~80% less
  - Some question on indirect land use impacts

- NBB has led development of ASTM Biodiesel specs
  - Started in 1993
  - Oil companies, OEM's and government agencies have provided an enormous amount of research
- B100 has an accepted ASTM specification:
  - D6751, first published in 2001
  - Several updates and improvements, work continues
- In 2008, B100 was accepted as a fungible component in the conventional diesel fuels in the US up to 5% (B5):
  - D975: On/Off road diesel fuel
  - D396: Home heating oils and boiler fuel
- In 2008, B6 to B20 has accepted ASTM spec: D7467
- Fuel specifications, minor compounds, and analytical issues associated with biodiesel are largely known

- RFS-2 requires over 1 billion gallons of ‘biomass based diesel fuel’ by 2012 by ‘obligated parties’
  - e.g. large refiners
- At B5 level, this is 20 Billion Gallons of B5
  - Roughly 2/3 of the on-road diesel market in the US!
- At those volumes, refiners will want to use the more efficient pipeline system for transporting biodiesel blends
- Up to 20 cents per gallon savings (pipeline vs. truck)
- If only 25% of the 1 billion gallons of biodiesel were transported on pipelines, that would save US consumers over \$50,000,000 annually
- There are additional benefits of pipelines vs. trucks
  - Lower GHG
  - Better overall fuel quality and blending accuracy

- Developed White Paper: “**Technical Needs for Biodiesel Blends in US Pipelines**”, August 2008
- Input to DOE / DOT Internal Road Map for biodiesel
- Worked with DOT / PHMSA on high priority needs fitting within PHMSA mission
- Proposal to PHMSA, with PBSC/NBB support, on Material Compatibility and Corrosion Inhibitor performance
- Met with Joint Inspection Group (JIG) ASTM Dec 2008
  - Large Petroleum Refiners (BP, Shell, Chevron, ExxonMobil, etc.)
  - Discussed working jointly to address PBSC White Paper
- Developed “**Pipeline Testing Protocols for Biodiesel and Biodiesel Blends**”, May 2009

- Green: Already addressed
- Yellow: In process of being addressed, no funding needed
- Pink: Partially in progress, more funding needed
- Red: No funding/work, funding needed

- All Biodiesel will need certificate of analysis confirming D6751 quality
- BQ-9000 companies should be used
- Will states develop different biodiesel specifications than ASTM?
  - If so, pipelines will require the most stringent
- Now that B5 in D975, D396 as a fungible component, there are relatively few technical issues associated with transport of up to B5 in pipelines that carry only gasoline, diesel, or heating oil. There are more of these pipelines than many realize.

- Impact on Drag Reducing Additives (DRA):
  - Do they dissolve in biodiesel blends like they do in diesel?
  - Do DRA's work the same, better or worse with biodiesel blends?
  - Will the presence of biodiesel cause DRA to 'drop out'?
- Impact on Corrosion Inhibitors:
  - Same issues as with DRA additives
  - Do test methods work as well with biodiesel as petrodiesel?
- How will biodiesel affect fuel conductivity?
- Need on-line methods for determining percent biodiesel incoming into the terminal:
  - ~1/2 percent level
  - ~ 5-30-100 ppm level?
- Will shipping biodiesel blends 'clean' the pipeline?



# Biodiesel Blend Pipeline Needs Questions: All Lines

- Need to address system integrity (meters, seals, flanges, elastomers, etc. ). B5 not expected to be problematic, but is more data needed on B6 to B20 blends?
- How do you do meter proving and temperature correction with biodiesel blends vs. normal diesel
- Will biodiesel blends pick up water in the pipeline?
- B5 is approved for on/off road use, heating oil, but will biodiesel blends affect gasoline in small levels?
- How will Renewable Identification Numbers be handled?
- Need to have a data collection protocol outlined so all pipeline and terminals can maximize data from trial runs.



# Biodiesel Blend Pipeline Needs Questions: Jet Fuel Lines

- What level of biodiesel is acceptable in jet fuel from the airline engine OEM's perspective? Should be at least 400 ppm or higher. This is a number 1 priority.
- How much biodiesel does it take before the results of the jet fuel test methods of D1655 are affected?
- Need methods for determining trail back of biodiesel:
  - ~ 5-30-100 ppm level



# Biodiesel Blend Pipeline Needs Questions: Jet Fuel Lines

- Does the trailback depend on the condition of the pipeline? If you clean the pipe will you see more or less trailback over time?
- What is best buffer product after the biodiesel run? Solvency of the buffer does matter and may impact how much buffer you need.
- Are there temperature and buffer composition affects on trailback?
- Will small levels of biodiesel in jet fuel be taken out by the bag filters at airports?
- Need to address impact on filter coalescers (MSEP)



# Biodiesel Blend Pipeline Needs Questions: Jet Fuel Lines

- Need to run biodiesel blends in jet engines.
  - How many engines?
  - What tests to run?
  - Each company?
- Do we need to officially incorporate allowance of some ppm level of biodiesel into D1655?
- Will trace components in the biodiesel affect the DRA trailback into jet fuel?
- Are there other regulatory needs that we have not yet uncovered? (i.e. UL approvals, etc.)

- JIG/PBSC/Airline/FAA/DESC meeting at ASTM June 23, 2009
- JIG/PBSC: Seek DOE funding for Energy Institute—Joint Industry program for OEM approval of 100 ppm FAME in Jet Fuel
- See EI—Joint Industry Project Slides
- Is it possible for DOT to provide some immediate funding as a partner in this Project?